



STUDY ON EVALUATION OF SERUM GAMMA-GLUTAMYL TRANSFERASE (GGT) LEVELS IN ACUTE CORONARY SYNDROME

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ABSTRACT Aim: The present study was undertaken with the aim to evaluate serum Gamma Glutamyl Transferase (GGT) levels in patients of acute coronary syndrome.

Methodology: This cross-sectional study was conducted on 50 cases with acute coronary syndrome (Group A) and 50 healthy control subjects (Group B) meeting inclusion and exclusion criteria.

Results: There is significant rise in serum GGT levels in patients presenting with ACS in Group A as compared to Group B.

Conclusion: Higher levels of GGT in ACS patients with risk factors such as hypertension, dyslipidemia and smoking may serve as biomarker to predict the occurrence of ACS.

KEYWORDS : Acute coronary syndrome, gamma glutamyl transferase, oxidative stress

INTRODUCTION

Cardiovascular disease is a group of disorders that affect the heart, blood vessels or both. More than 2.5 million hospitalizations are due to acute coronary syndrome (ACS) worldwide.¹ Coronary artery disease and ACS together account for approximately 7 million deaths each year.² The incidence of ACS is very high in Indians due to rapidly changing lifestyle and in fact maximum burden of ACS in the world is in India.³

Gamma glutamyl transferase (GGT) is being studied for its role in atherosclerotic cardiovascular diseases and it is also being studied as a marker of severity of oxidative and atherosclerotic burden in the arterial system. This has practical implications in so far as it can help in selecting patients with higher risk for mortality.⁴ To assess the burden of inflammation in myocardial infarction, GGT is one of the promising enzymes because of its role in inflammation.

Several population based studies have found positive associations of GGT with incidence of cardiovascular event with proposed mechanism of oxidative stress.^{5,6} GGT levels may be an indicator of high level of oxidative stress which is known to be associated with atherosclerosis.

The present study was undertaken with the aim to evaluate the serum GGT levels in patients of ACS.

MATERIALS AND METHODS

The study was an observational cross sectional comparative hospital based study and was conducted in Department of General Medicine, Government Medical College, Amritsar, Punjab.

Study population: Patients admitted in Medicine department through Emergency and Medicine outdoor with diagnosis of acute coronary syndrome were included in the study. Total number of cases were 50 including both males and females, who presented with the first episode of acute coronary syndrome. They were compared with 50 age and sex matched healthy control subjects with no evidence of coronary artery disease. The blood samples were taken within 24 hours of onset of ACS and sent for GGT level estimation and other routine biochemical tests. Carboxy substrate method was used to estimate GGT. Normal value of serum GGT for males is 10-50 U/L and for females is 7-35 U/L.⁷

The information collected regarding all the participants in the study was recorded and tabulated. Data analysis was done with the help of

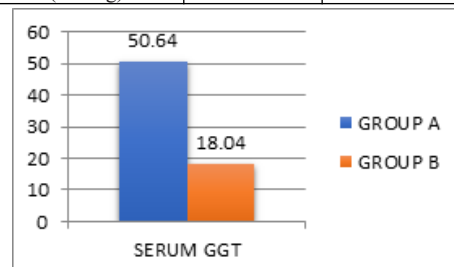
computer using software Statistical Package for the Social Sciences (SPSS Version 22.0).

RESULTS

Mean age in years in group A [patients with acute coronary syndrome] and group B [patients without acute coronary syndrome] was almost similar i.e. 55.76 ± 10.722 years and 53.66 ± 11.979 years respectively. Both groups had an almost similar gender and age distribution. The difference in baseline parameters in patients between two groups are shown in table 1.

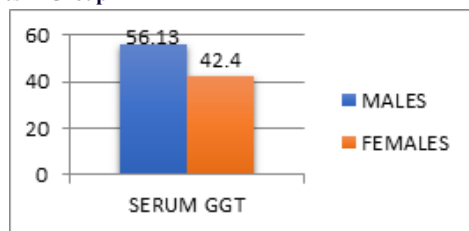
Table 1: Difference In Baseline Parameters Between Two Groups

PARAMETERS	GROUP A	GROUP B	P value
Number of patients (M/F)	50(30/20)	50(27/23)	0.545
Age (years)	55.76 ± 10.722	53.66 ± 11.979	0.358
TC (mg/dl)	183.82 ± 39.141	170.56 ± 17.980	0.32
TG (mg/dl)	128.48 ± 44.860	75.80 ± 29.877	< 0.001
HDLc (mg/dl)	44.60 ± 7.039	46.78 ± 6.813	0.119
WC (in cm)	88.26 ± 14.476	77.42 ± 7.714	< 0.001
GGT (units/litre)	50.64 ± 22.396	18.04 ± 3.602	< 0.001
FBS (mg/dl)	125.44 ± 33.320	84.76 ± 17.048	< 0.001
PPBS (mg/dl)	195.60 ± 53.489	117.04 ± 35.699	< 0.001
Blood urea (mg/dl)	30.14 ± 6.484	26.36 ± 1.946	< 0.001
SBP (mm/hg)	147.92 ± 27.630	152.16 ± 27.967	0.448
DBP (mm/hg)	87.84 ± 12.878	94.44 ± 15.672	0.024



Graph 1: Comparison Of Ggt Levels Between Two Groups A & B

Mean serum GGT level in ACS population was 50.64 U/L, while in control population it was 18.04 U/L. This difference in the GGT levels between both the groups was statistically significant ($p=0.001$) shown in graph 1.

Graph 2: Comparison Of Mean Ggt Levels Between Males And Females In Group A

Mean serum GGT levels in males in group A was 56.13 U/L while in females it was 42.40 U/L. This difference in the GGT levels between both the groups was statistically significant. This was found that mean serum GGT level was higher in males with ACS as compared to females with ACS shown in graph 2.

Table 2: Correlation Of Serum Ggt Levels With Lipid Profile And Waist Circumference In Group A

CHARACTERISTICS OF POPULATION	SPEARMAN'S CORRELATION (R)	p VALUE
Waist Circumference (cm)	0.745	0.001**
Total Serum Cholesterol (mg/dl)	0.665	0.001**
Serum TG (mg/dl)	0.640	0.001**
Serum HDLc (mg/dl)	-0.298	0.036*
Serum LDLc (mg/dl)	0.651	<0.001**
Serum VLDLc (mg/dl)	0.653	<0.001**

Group A mean serum GGT levels in patients with hypertension was 63.67 U/L while in patients without hypertension it was 31.1 U/L. This difference in the GGT levels between both the groups was however statistically significant. Group A mean serum GGT levels in smokers was 52.10 U/L while in non-smokers it was 49.67 U/L. This difference in the GGT levels between both the groups was although statistically not significant but higher levels of mean serum GGT was seen among smokers. Serum GGT levels correlated positively according to univariate analysis with waist circumference (Spearman's rho $R=0.745$), total serum cholesterol ($R=0.665$), serum TG ($R=0.640$), LDLc ($R=0.651$) and VLDLc ($R=0.653$) and inversely with serum HDLc ($R=-0.298$) in group A (Table 2). By normal standards, the association between all the variables in comparison to serum GGT levels were considered as statistically significant. There is positive linear correlation of serum GGT levels with waist circumference, total serum cholesterol, serum TG, serum LDLc and serum VLDLc levels. Serum HDLc levels are inversely related with GGT levels.

DISCUSSION

It was observed that difference in the GGT levels between both the groups was statistically significant. Dogan et al (32 vs. 16 U/L, $p=0.001$) and Emiroglu et al had found similar results.^{8,9} A study by Hood et al GGT was a strong indicator of myocardial cell death and predicted that GGT is associated with MI.¹⁰ Our study showed no significant correlation between type of ACS and GGT positivity with a p value of 0.502.

It was observed in our study that there was significant rise in serum GGT levels (63.67 ± 19.032 vs 31.10 ± 8.416) in hypertensives in group A as compared to non-hypertensives. Jung et al, Yamda et al, Wannamethee et al had shown similar results.^{11,12,13}

Serum GGT levels correlated positively according to univariate analysis with waist circumference (Spearman's rho $R=0.745$), total serum cholesterol ($R=0.665$), serum TG ($R=0.640$), LDLc ($R=0.651$) and VLDLc ($R=0.653$) and inversely with serum HDLc ($R=-0.298$) in group A. Jung et al, Zoppini et al, Jimba et al and Lee et al showed strong positive linear correlations of serum GGT levels with BMI, waist circumference, total cholesterol, LDLc and TG levels.^{11,14,15,16} Gopal et al showed statistically significant raised serum GGT level with high waist circumference.¹⁷

CONCLUSION

It is concluded that elevated serum GGT level is associated with increased risk of development of ACS with male gender predisposition and is also associated with its risk factors like hypertension and dyslipidemia. GGT may serve as convenient and cost-effective biomarker to predict the occurrence of ACS and it might reflect an elevated oxidative stress.

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